

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Amendment of the Commission's Rules with)	GN Docket No. 13-185
Regard to Commercial Operations in the)	
1695-1710 MHz, 1755-1780 MHz and 2155-)	
2180 MHz Bands)	WT Docket No. 07-195
)	(Proceeding Terminated)
Service Rules for Advanced Wireless Services)	
in the 2155-2175 MHz Band)	
)	WT Docket No. 04-356
Service Rules for Advanced Wireless Services)	(Proceeding Terminated)
in the 1915-1920 MHz, 1995-2000 MHz,)	
2020-2025 MHz, and the 2175-2180 MHz)	
Bands)	WT Docket No. 07-16
)	(Proceeding Terminated)
Applications for License and Authority to)	
Operate in the 2155-2175 MHz Band)	
)	WT Docket No. 07-30
Petitions for Forbearance under)	(Proceeding Terminated)
47 U.S.C. § 160)	

**REPLY COMMENTS OF
RAYTHEON COMPANY**

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SUMMARY

In their opening comments, the advocates of Advanced Wireless Spectrum (“AWS”) seeking access to the 1695-1710 MHz band acknowledged the need for sharing the band with incumbent Meteorological Satellite (“MetSat”) operations. AWS proponents also generally endorsed, or at least did not oppose, the use of Protection Zones and limiting the 1695-1710 MHz band to uplink (*i.e.*, mobile and handset) operations under the control of a fixed base station. Indeed, several of the AWS commenters recognize that, for purposes of deployment without restriction, the Protection Zone proposals represent a considerable improvement over the Exclusion Zones originally suggested in the 2010 Fast Track Report of the National Telecommunications and Information Administration. However, AWS commenters, on the whole, refrained from detailed discussions regarding coordination, testing, interference resolution, and enforcement in the 1695-1710 MHz band, matters which Raytheon Company (“Raytheon”) addressed in its initial comments. Raytheon responds to comments on subjects potentially impacting coordination and interference resolution in and around Protection Zones.

The Protection Zones were calculated based upon the proposed mobile (*i.e.*, handset) limit of 20 dBm, and that restriction should be adopted, contrary to suggestions by some AWS proponents that higher powers be permitted. At a minimum, the 20 dBm limit should apply *in and near the vicinity of the Protection Zones*, which Motorola acknowledges, AWS licensees could implement “through network signaling and power control.” If the Commission permits a higher limit for mobiles and portables without geographic restrictions, then the sizes of the Protection Zone must be increased, as CTIA, for example, recognizes.

AWS operations at or near the 1695 MHz band edge must be subject to adequate out-of-band-emissions (“OOBE”) limits to protect those MetSat operations in the 1675-1695

MHz band, including critical Emergency Managers Weather Information Network (“EMWIN”) operations located at 1694.1 MHz. The OOB limit at the lower band edge (1695 MHz) must be supported by sufficient testing and/or analysis – which have not yet occurred – before adoption.

While Raytheon takes no position on whether the 1695-1710 MHz band should be paired with another band, neither the 2095-2110 MHz nor the 2360-2395 MHz bands would present acceptable options for that purpose. The entire 2025-2110 MHz band, including the 2095-2110 MHz subband, supports critical TDRSS communications with Federal and commercial satellites and space stations, and may become an integral element of commercial manned spaceflight programs. The 2360-2395 MHz flight test telemetry band is also an inappropriate candidate for pairing. Flight test operations are incompatible with high density terrestrial operations whether mobile or fixed. Moreover, this band was the subject of a recently adopted spectrum sharing framework between flight testing (primary) and medical telemetry (secondary) uses which followed a difficult proceeding and should not be overturned on the eve of its implementation.

The Commission should opt for larger AWS license areas in the 1695-1710 MHz band, at least in the vicinity of Protection Zones, to better facilitate coordination and interference resolution. Further, performance or build out requirements should exclude consideration of AWS construction and operation in the Protection Zones, even if coordination is successful, so as to not create unwarranted pressure to introduce operation within Protection Zones.

The AWS-1 coordination model, however workable it has proven in the 1710-1755 MHz band, does not offer sufficient protection against interference in the 1695-1710 MHz band. T-Mobile’s call for a single point of contact within the federal government for coordination should also be rejected, at least in the 1695-1710 MHz band, as coordination will often require location-specific or agency-specific solutions, accounting for the role each site

plays in fulfilling larger agency-specific missions. Each affected federal agency should be free to determine the best means of communication for coordination and interference purposes, including appropriate contacts.

Finally, spectrum lessees, transferees, and assignees should have the same coordination obligations as original licensees in and around Protection Zones and cannot leverage the previous coordination, if any, of the underlying licensee with MetSat users, except in limited circumstances. Raytheon submits that, to ensure such coordination takes place, licensees in and near Protection Zones should have an obligation in the rules to notify federal agencies directly of any lease arrangements or proposed transfers or assignments.

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**REPLY COMMENTS OF
RAYTHEON COMPANY**

Raytheon Company ("Raytheon"), by its attorneys, submits its reply to the opening comments filed in the above-referenced proceeding in response to the Notice of Proposed Rulemaking.¹ In its comments in this proceeding, Raytheon addressed matters relevant to the coordination processes and procedures, testing and validation, interference resolution, and enforcement related to Advanced Wireless Spectrum ("AWS") licensees gaining

¹ *Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, Notice of Proposed Rulemaking and Order on Reconsideration, FCC 13-102, GN Docket No. 13-185 (rel. July 23, 2013) ("NPRM").

access to the 1695-1710 MHz band on a shared basis with Meteorological Satellite Services (“MetSat”) operators. In their opening comments, the advocates of AWS gaining access to the 1695-1710 MHz band acknowledged the need to share the band with incumbent MetSat operators. While the AWS commenters typically refrained from detailed discussions regarding coordination, testing, interference resolution, and enforcement, they did comment on pairing another band with the 1695-1710 MHz band and several of the proposed service rules for the band pertinent to a sharing framework. Raytheon offers its reply to those comments as they relate to the potential for sharing with MetSat operations in the 1695-1710 MHz band and the adjacent 1675-1695 MHz band, home to both MetSat operations and Meteorological Aids (“MetAids”).

Raytheon reiterates its opposition to pairing the 1695-1710 MHz band with the 2095-2110 MHz band, supporting the comments of others in this regard. In addition, Raytheon joins those commenters opposed to making the 2360-2395 MHz band available for AWS use. AWS operations in that band would be wholly incompatible with aeronautical flight testing there as well as the secondary use for which the Commission authorized in 2012 for a new medical telemetry application, *i.e.*, Medical Body Area Networks.

I. DISCUSSION

A. Protection Zones and Mobile Power Levels

In the *NPRM*, the Commission proposed to follow the recommendations of the Working Group 1 (“WG-1”) of the Commerce Spectrum Management Advisory Committee (“CSMAC”) and protect 27 federal MetSat sites operating in the 1695-1710 MHz band through

the use of Protection Zones.² None of the commenters supporting an AWS allocation in the band challenge this proposal and the need to protect reception of critical meteorological data.

Reception and the subsequent use of that data by government, businesses, other institutions, and the public rely today, and will depend for many years on, continued access by MetSat operators to the 1695-1710 MHz band. Further, several of the AWS commenters recognize that the Protection Zone proposals in the *NPRM* regarding access to the 1695-1710 MHz band represent a considerable improvement, for AWS deployment, over the Exclusion Zones originally suggested by the analysis in the 2010 Fast Track Report of the National Telecommunications and Information Administration (“NTIA”).³ T-Mobile and Ericsson characterize the proposed Protection Zones, embodying the anticipated separation distance between LTE-based mobile wireless base stations and incumbent MetSat users that must be maintained to avoid interference into the MetSat receiver(s) at the protected site, as a “substantial reduction” from the protection obligations represented in the FTR.⁴ Because the Protection Zones do represent such a material scaling back of the geographic area in which AWS operations may be affected by sharing limitations, Raytheon explained in its opening comments that the rules governing sharing, either directly or indirectly, in and around the Protection Zones be both carefully articulated and

² *Id.* ¶¶ 58-59. See Commerce Spectrum Management Advisory Committee Final Report, Working Group 1 – 1695-1710 MHz Meteorological-Satellite, Rev. 1, Appendix 1 (July 23, 2013) (“WG-1 Report”).

³ See Department of Commerce, “An Assessment of the Near-Term Viability of Accommodating Wireless Broadband Systems in the 1675-1710 MHz, 1755-1780 MHz, 3500-3650 MHz, and 4200-4220 MHz, 4380-4400 MHz Bands,” October 2010 (“FTR”).

⁴ See Comments of T-Mobile USA, Inc., GN Docket No. 13-185 at 9 (Sept. 18, 2013) (“Comments of T-Mobile”); *accord* Comments of Ericsson, GN Docket No. 13-185, at 9 (Sept. 18, 2013) (“Comments of Ericsson”) (“Based on input from WG-1, the anticipated separation distance between which an LTE-based mobile wireless system would be expected to potentially cause interference into a meteorological satellite receiver has been *significantly reduced* from the previous analysis contained in the NTIA’s Fast Track Report” (emphasis supplied)).

rigorously enforced if AWS licensees are to have access to any portion of the “substantially reduced” Protection Zones.⁵

The 1695-1710 MHz band should be used by AWS operations only on an uplink basis, *i.e.*, for communications from mobiles and portables to fixed base stations. There was a strong consensus for this arrangement by AWS advocates.⁶ None of the AWS proponents argues for making the 1695-1710 MHz band available for fixed, *i.e.*, downlink, operations, whether on a high-power or low-power basis. Thus, the record unambiguously supports the Commission adopting rules that permit only uplink operation in the band and expressly prohibit any fixed station operation in these frequencies.

The Commission proposed in the *NPRM* that mobiles operating in the 1695-1710 MHz band be subject to a 20 dBm EIRP power limit.⁷ Several AWS advocates take issue with this proposed limit. They argue that the Commission should instead adopt the same limit that applies to AWS-1 mobiles, which are permitted to operate up to 1 watt EIRP the equivalent of 30 dBm.⁸ Verizon Wireless advocates a less severe softening of the proposal, specifically a limit of

⁵ See, *e.g.*, Comments of Raytheon Company, GN Docket No. 13-185, at 22-24 (Sept. 18, 2013) (“Raytheon Comments”).

⁶ See, *e.g.*, Comments of T-Mobile at 26 (“T-Mobile agrees that the 1695-1710 MHz and 2020-2025 MHz bands are properly characterized as uplink bands given current Information”); Comments of Verizon Wireless, GN Docket No. 13-185, at 24 (Sept. 18, 2013) (“Comments of Verizon Wireless”) (“[T]he Commission should prohibit fixed stations in the 1695-1710 MHz and 1755-1780 MHz uplink bands”); Comments of the Telecommunications Industry Association, GN Docket No. 13-185, at 12 (Sept. 18, 2013) (“Comments of TIA”); Comments of Nokia Solutions and Networks, GN Docket No. 13-185, at 20 (Sept. 18, 2013) (“Comments of Nokia”).

⁷ See *NPRM* ¶ 102-03.

⁸ See, *e.g.*, Comments of CTIA-The Wireless Association, GN Docket No. 13-185, at 26-27 (Sept. 18, 2013) (“Comments of CTIA”); Comments of TIA at 13; Comments of Nokia at 20; Comments of T-Mobile at 31-32.

23 dBm or 200 mW EIRP, which represents “existing standard LTE maximum mobile uplink power for the AWS-1 band.”⁹

Significantly, the Protection Zones were calculated based upon the proposed limit of 20 dBm,¹⁰ and that restriction should be adopted. At the very minimum, the 20 dBm limit should apply *in and near the vicinity of the Protection Zones*. As Motorola acknowledges, “[s]uch a local restriction could be implemented through network signaling and power control.”¹¹ If, however, the Commission permits a higher limit for mobiles and portables without this vicinity-of-Protection-Zones exception, then the Protection Zone distances must be increased. As CTIA recognizes, “AWS-1 mobiles operating with an EIRP of greater than 100 milliwatts (20 dBm) are subject to additional coordination requirements to protect incumbent Federal operations. Handsets transmitting at a power or antenna height above this threshold must coordinate *at a greater distance*.”¹² The same coordination distance requirement should apply in the AWS-3 band, which would mean *larger* Protection Zones than those proposed if a power limit in excess of 20 dBm EIRP is adopted.¹³

⁹ Comments of Verizon Wireless at 24.

¹⁰ WG-1 Report, Appendix 7 at [2] (“The [user equipment] EIRP levels used in the analysis range from a maximum value of 20 dBm to a minimum value of -30 dBm”).

¹¹ Comments of Motorola Mobility LLC, GN Docket No. 13-185, at 9 (Sept. 18, 2013) (“Comments of Motorola”). DISH Network Corporation, in its reply comments, admits that LTE networks “can impose a suitable mobile power limit around the Protection Zones to safeguard federal meteorological receive sites,” while permitting “AWS-3 devices operating outside [the vicinity] of Protection Zones” to operate at a higher power. Reply Comments of DISH Network Corporation, GN Docket No. 13-185, at 10 (Oct. 17, 2013).

¹² Comments of CTIA at 26-27 (emphasis supplied).

¹³ Protection Zones should also be subject to enlarged boundaries in the event that federal monitoring stations detect uncoordinated operation above certain interference protection thresholds or, during operations, the federal systems experience interference from AWS operations, whether coordinated or not.

It is also critically important that AWS operations at or near the band edge at 1695 be subject to adequate out-of-band-emissions (“OOBE”) limits to protect MetSat operations in the 1675-1695 MHz band. Warranting special consideration are the Emergency Managers Weather Information Network (“EMWIN”) operations at 1694.1 MHz, just below the proposed AWS-3 band edge. This frequency plays a central role in ensuring access by the emergency management community to a live stream of National Weather Service warnings, watches, forecasts, and other emergency information that are vital to protecting life and property. The *NPRM* proposes the “standard” OOBE limit of $43 + 10 \log_{10}(P)$ dB to protect operations below 1695 MHz, but offers no analysis that this will be sufficient to protect operations on this EMWIN frequency or those of other adjacent band MetSat and MetAids systems. T-Mobile, among other AWS proponents, suggests that the Commission adopt the “usual” OOBE limit because it has “proven to be sufficient in addressing interference concerns” in the AWS-1 and AWS-4 bands and because of claimed potential arising from harmonizing the rules for the AWS-3 bands with the rules for the AWS-1 and AWS-4 bands.¹⁴ Whatever the merits of those OOBE limits might be for the AWS-1 and AWS-4 bands, the 1695-1710 MHz band does not present the same considerations or suitability for such a limit, if for no other reason because of EMWIN’s use of 1694.1 MHz and its importance to safety of life and property. Before the Commission adopts an OOBE limit applicable at the 1695 MHz band edge for AWS-3 systems, sufficient testing and/or analysis should be completed to support the Commission’s determination in light of the EMWIN and other operations below 1695 MHz.

¹⁴ Comments of T-Mobile at 30.

B. Band Pairing Considerations

Raytheon explained in its comments that the analysis of the National Aeronautics and Space Administration (“NASA”) on co-frequency interference to the Tracking and Data Relay Satellite System (“TDRSS”) spaceborne receivers in the 2025-2110 MHz reveals that shared use of the band with AWS operations would be infeasible.¹⁵ Most AWS proponents nonetheless request that the Commission pair the 1695-1710 MHz band with 2095-2110 MHz. Some of those commenters, in support, seemingly contend that the Spectrum Act¹⁶ envisions the Commission auctioning a 15 MHz band with the 1695-1710 MHz band, and argue that 2095-2110 MHz should be the additional 15 MHz-wide band.¹⁷ While Congress did require the Commission to auction 15 MHz from the 1675-1710 MHz band – which the *NPRM* proposes to satisfy by making the 1695-1710 MHz band available to AWS – and did require the Commission to identify another 15 MHz band for auction for commercial mobile broadband, the Spectrum Act does not require that the 1695-1710 MHz band be paired, let alone paired with a particular band. Accordingly, although Raytheon certainly does not oppose in principle the pairing of the 1695-1710 MHz band with *an appropriate 15 MHz band*, there is no support to be found in the statute for a pairing of the 1695-1710 MHz band with any band, let alone the 2095-2110 MHz.¹⁸

¹⁵ Comments of Raytheon at 39.

¹⁶ The Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, § 6401, 126 Stat. 156, 222-224 (2012) (“Spectrum Act”).

¹⁷ *See, e.g.*, Comments of the United States Cellular Corp., GN Docket No. 13-185, at 4 (Sept. 18, 2013) (“Comments of United States Cellular Corp.”); Comments of Ericsson at 8.

¹⁸ Section 6401 of the Spectrum Act simply requires “an additional 15 MHz” be allocated by the Commission and auctioned in 2015. There is no guidance as to where that spectrum is to be located or indication that it be paired with 1695-1710 MHz band or any other band. (Nothing precludes such a pairing, either.) Similarly, Section 6401 does not provide any direction that the 15 MHz to be auctioned from the 1675-1710 MHz band is to be auctioned on a paired basis. Were the Commission to allocate 1755-1780 MHz, for example, to AWS-3, that action would fully satisfy the unambiguous letter of the statute that an “additional 15 MHz” of spectrum be allocated for commercial broadband use,

Furthermore, statutory considerations aside, the 2095-2110 MHz band would simply be an improper choice. As the Boeing Company (“Boeing”) summarized in its comments, “space operations require the entire 2025-2110 MHz band, including the 2095-2110 MHz subband, to support critical TDRSS communications with Federal and commercial satellites and space stations, and will be an integral element of commercial manned spaceflight programs undertaken by United States companies in the near future.”¹⁹ In addition, as TIA acknowledges, the Department of Defense has identified the 2025-2110 MHz band as the new home for some of the operations it anticipates being moved from 1755-1780 MHz if that band, as proposed, is allocated for AWS-3 operations.²⁰ Regardless of whether the 2095-2110 MHz band (assuming there was no problem arising from the current uses of the band) might be, as AT&T suggests, “an ideal pairing” with 1695-1710 MHz band, that carrier acknowledges “there might be other options as well” for pairing 1695-1710 MHz with another band.²¹ If the Commission decides that the 1695-1710 MHz should be auctioned on a paired basis, the Commission should

regardless of which band, if any, 1755-1780 MHz is paired. CTIA’s argument that the legislative history supports a paired allocation for 1695-1710 MHz is unavailing. *See* Comments of CTIA at 13. Indeed, the fact the final House bill included a provision for 15 MHz in addition to 1755-1780 MHz, whereas the final legislation was silent on allocating 1755-1780 MHz and where the additional 15 MHz is to come from actually leads to the opposite conclusion, namely that 1755-1780 MHz can be the source of the “additional 15 MHz” that Congress requires be auctioned in addition to the specific spectrum bands identified in the Spectrum Act for auction.

¹⁹ Comments of Boeing Co., GN Docket No. 13-185, at 4 (Sept. 18, 2013) (“Comments of Boeing”). *See also* Letter from Ali Bahrami, Vice President, Civil Aviation, Aerospace Industries Association, to Acting Chairwoman Mignon L. Clyburn, Federal Communications Commission, at 3 (Sept. 18, 2013) (on file in GN Docket No. 13-185) (“Comments of AIA”) (pairing of 1695-1710 MHz band and spectrum from 2025-2110 MHz “unacceptable” due to “ongoing satellite operations already in” the latter band).

²⁰ Comments of TIA at 11. Further, the National Association of Broadcasters (“NAB”) oppose the allocation of the 2095-2110 MHz band for auction on a paired basis with the 1695-1710 MHz band because of their longstanding use of the band for Broadcast Auxiliary Service operations. Comments of the National Association of Broadcasters, GN Docket No. 13-185, at 3, 6 (Sept. 18, 2013) (“Comments of NAB”).

²¹ Comments of AT&T Inc., GN Docket No. 13-185, at 5 (Sept. 18, 2013) (“Comments of AT&T”).

explore and, because of the unsuitability of 2095-2110 MHz for sharing with AWS operations in light of its current uses, settle on one of those “other options,” assuming it is otherwise suitable, rather than reallocate spectrum from the 2095-2110 MHz band for that purpose.

If the Commission nonetheless believes that further consideration of the 2095-2110 MHz band is warranted, the comments from AWS proponents leave no doubt that additional study would be required to determine whether, contrary to the analysis conducted thus far, the band could, in fact, somehow be shared with incumbent uses as well as the expected additional Department of Defense operations that would be relocated from 1755-1780 MHz.²² In that event, as T-Mobile recognizes, the auction of the 1695-1710 MHz band would have to be delayed by leave of Congress if the Commission wishes to preserve the potential for auctioning that band on a paired basis with another band, whether with 2095-2110 – which should not occur – or a more suitable band. In no event should the Commission consider allocation of any band without a full review of the potential ramifications for incumbent users in the candidate band and both of the adjacent bands.

The 2360-2395 MHz Aeronautical Mobile Telemetry (“AMT”) band is also an inappropriate candidate home for spectrum to pair with the 1695-1710 MHz band. Raytheon supports the comments of the Aerospace & Flight Test Radio Coordinating Council (“AFTRCC”) and Boeing opposing consideration of the safety-of-life 2360-2395 MHz band for shared AWS operations.²³ Flight test operations and associated telemetry communications occur over large geographic areas and require exceedingly low noise levels to ensure successful

²² *Accord, e.g.*, Comments of T-Mobile at 23; Comments of the Competitive Carriers Association, GN Docket No. 13-185, at 6 (Sept. 18, 2013) (“Comments of CCA”); Comments of CTIA at 17.

²³ Comments of the Aerospace and Flight Test Radio Coordinating Council, GN Docket No. 13-185, at 3-5 (Sept. 18, 2013) (“Comments of AFTRCC”); Comments of Boeing at 5-6.

operation and protection of life and property both in the air and on the ground. Consequently, AMT operations are incompatible with high density terrestrial operations whether mobile or fixed. Co-channel or adjacent channel interference from AWS operations would offer a significant risk of safety of life to test pilots and personnel on the ground as well as imperil both test and other property. After a long proceeding capped by an extended coordinated effort by AFTRCC and its members with major players in the medical telemetry industry, the Commission last year adopted rule changes enabling the Medical Body Area Networks (“MBANs”) service to operate on a secondary basis to AMT. To properly protect AMT operations, MBANs will be subject to strict coordination requirements and operational limitations (*e.g.*, indoor operation only within qualified health institutions in the 2360-2390 MHz band in line-of-sight of AMT stations) that AWS licensees almost certainly would not find acceptable. For these reasons, Raytheon joins in the position of AFTRCC and Boeing that the 2360-2395 MHz band should be summarily rejected as a possible option for an AWS allocation, as proposed by the Society of Broadcast Engineers.²⁴ Notably, none of the AWS commenters proffered 2360-2395 MHz, or any portion of it, as the source for spectrum to pair with any other band at issue in this proceeding.

C. AWS Licensing Areas and Performance Requirements

The record presents the differing views of AWS industry participants regarding the licensing areas in the 1695-1710 MHz band. Some commenters endorse the proposed Economic Areas (“EAs”) and other filers argue that smaller geographic license sizes, such as Cellular Market Areas (“CMAs”), are more appropriate. From the standpoint of successful

²⁴ See NPRM ¶ 21. In addition, Philips Healthcare, an MBANs manufacturer, filed comments opposing an AWS allocation in the band because of the potential for interference to MBANs operations. See Comments of Philips Healthcare Systems, GN Docket No. 13-185, at 1, 3 (Sept. 18, 2013) (“Comments of Philips Healthcare”).

coordination between MetSat users at protected federal sites and AWS operators, Raytheon submits that larger license areas would better serve the public interest.

Smaller license areas would be more likely to complicate the coordination process in the vicinity of Protection Zones, which could delay AWS service roll out (assuming coordination ultimately were successful), and increase potential interference concerns. Incumbent users would have to coordinate with a potentially larger number of operators if licensing is over smaller geographic areas. In that event, there potentially would be a greater number of AWS licensees to coordinate not only with the licensee but among themselves to ensure that interference limits are not exceeded by the aggregate operations relative to individual protected sites. Similarly, resolution of interference events suffered by protected federal users, on the whole, is likely to be more complicated with a greater number of licensees one or more of whom (or even all) may be contributing to the interference. Further, in the event of smaller license areas, there is an increased chance that, in some cases, all or virtually all of license areas may be within a Protected Zone.²⁵ Raytheon submits that, at a minimum, the use of larger geographic license areas in vicinity of Protection Zones would be appropriate even if smaller areas are used elsewhere.

The AWS commenters also present a variety of viewpoints regarding performance requirements, some advocating in favor of the Commission's proposed percentage-population-coverage benchmark approach, whereas others promote a "substantial service" approach (or some hybrid); commenters also debate whether a "keep what you build" penalty framework should be implemented versus regulations terminating an entire license if final benchmarks are

²⁵ If any license were wholly within a Protected Zone, Raytheon submits that no performance requirements should apply to such licenses, since there is no guarantee that coordination will be successful within any given Protection Zone. As a practical matter, such a licensee may never be able to operate an AWS system using such a license despite efforts by federal agency users and the licensee to coordinate shared use.

not met.²⁶ Raytheon takes no position on these issues in general. However, in its comments, Raytheon explained why any performance or build out requirements, however they are established, should exclude the Protection Zones.²⁷ In light of the various stances taken by the AWS proponents on these matters, Raytheon reiterates its earlier position: regardless of which of the performance requirements the Commission adopts, the area within a Protection Zone, *whether there has been successful coordination with the federal incumbent or not*, should be excluded from any consideration of whether the licensee satisfies its build out obligations. Any other approach would effectively presume that the licensee is going to be able to operate within a Zone, as Raytheon explained earlier, something which fundamentally flies in the face of the principles underlying a Protection Zone framework and which should not be prejudged.²⁸ The Commission should be wary of creating regulatory incentives for AWS licensees to be overly-aggressive in pursuing the ability to operate in Protection Zones.

In addition, the Commission should not embrace T-Mobile's suggestion that, in addition to its argument for strict objective performance requirements, "the Commission should remain open to case-by-case relief if it proves that government use impedes build out longer than

²⁶ Compare Comments of T-Mobile at 32-33 (opposing a substantial service test and supporting the proposed population-based performance requirements with certain modifications); Comments of Verizon Wireless at 20-21 (supporting population-based requirements with a "keep what you build" enforcement approach) with Comments of United States Cellular Corp. at 60 (endorsing a "substantial service" performance requirement); Comments of AT&T at 14 (supporting a keep-what-you-build enforcement approach); Comments of CCA at 9 (keep-what-you-build enforcement approach).

²⁷ Raytheon Comments at 37-39. Notably, AWS commenters were largely silent on the way in which the Protection Zones should be treated in the context of performance requirements.

²⁸ If a "keep what you build" approach is adopted, any area in a Protection Zone in which build out has not occurred by the licensee's deadline should be treated as an Exclusion Zone from that point out until federal programs at the protected site cease operation in the 1695-1710 MHz band.

anticipated.”²⁹ As an initial matter, Raytheon notes that in the 1695-1710 MHz band such relief would simply be unnecessary if Protection Zones were excluded from build out requirements, as it proposes. In that event, government use should not impede build out unless a Protection Zone proves to be too small, and interference is caused by AWS operations outside the Zone. But in that case, the Protection Zone should be resized without penalty to the AWS licensee.

Furthermore, adoption of T-Mobile’s suggestion would almost certainly lead to increases in administrative burdens for licensees and the Commission alike as parties address *ad hoc*, after-the-fact requests for relief. Finally, adoption of T-Mobile’s concept may cause licensees to focus unnecessarily on trying to pursue coordination beyond what is sound rather than concentrating on building out areas outside a Protection Zone altogether or in already coordinated areas.

D. Coordination and Operational Rules

Raytheon provided detailed comments regarding appropriate coordination procedures to help ensure successful sharing between protected MetSat sites and AWS licensees in 1695-1710 MHz band. In its comments, among other things, Raytheon explained why the AWS-1 coordination model, however workable it may have been within 1710-1755 MHz, is not sufficient to provide interference protection to the fundamentally different sharing situation at 1695-1710 MHz band.³⁰ AWS proponents offer very little comment in their submissions in the record to date on the 1695-1710 MHz band coordination portion of the sharing framework, even to the point of not addressing the suitability of using the AWS-1 coordination model in the band. T-Mobile is a notable exception, endorsing the AWS-1 approach,³¹ and Raytheon incorporates its initial comments on this issue by way of response.

²⁹ See Comments of T-Mobile at 33.

³⁰ See Raytheon Comments at 22-24.

³¹ See Comments of T-Mobile at 10.

T-Mobile proposes an additional detail in the hopes of streamlining the coordination process for AWS licensees. In particular, T-Mobile calls for a single point of contact within the federal government for purposes of coordination.³² In the 1695-1710 MHz band, this approach is unlikely to be practical or effective, in Raytheon's opinion. The federal parties in the best position to coordinate within any given Protection Zone are typically agency-specific, and in some cases site-specific, as the responsible agencies are most familiar with running the federal operations to be protected. The potential for successful coordination is unlikely to be the same at all 27 proposed protected federal sites. Indeed, the character of the federal operations, by and large, is unique to each agency and potentially each site such that any coordination will be location-specific. The key consideration for successful coordination, if achievable, is what mechanics will ensure sufficient protection against interference. Meeting that objective requires, on the government side, agency-specific knowledge about the federal operations, including the role the specific site's operations play in fulfilling the larger agency mission. Given that there are only 27 sites, operated across a small number of agencies, the burden would not be unduly great for AWS-3 licensees to contact each agency and coordinate in a manner suitable for that agency. Perhaps the best solution in response to T-Mobile's suggestion for a single federal contact for all the protected sites is for each federal agency operating one or more of the sites to determine and publish the best means of communication for affected AWS-3 licensees in or adjacent to the Protection Zones for purposes of coordination and interference resolution, including appropriate contacts. A useful tool may be for all federal contacts (from multiple affected agencies) and their coordination and interference resolution support to be linked on a site-by-site basis using a common software portal, which would be

³² *Id.* at 11-12.

accessed by all AWS licensees. However, the complete coordination and analysis process, as well as interference resolution, in Raytheon's opinion, does not readily lend itself to automation using such a portal.

Coordination obligations, of course, will extend to all AWS licensees with operating authority overlapping with Protection Zones. But beyond that, the Commission's rules should make clear that any operators benefitting from the secondary market, *e.g.*, spectrum lessees should have independent, equal, and comprehensive coordination obligations. Verizon Wireless, for example, argues for rules promoting a robust secondary market.³³ If flexible use and spectrum leasing are permitted in the 1695-1710 MHz band, to which Raytheon has no opposition in principle, such uses cannot come at a cost of leniency with regard to preserving full obligations for AWS operators under the technical, coordination, testing, and interference and protection rules. Spectrum lessees, and flexible use licensees, must be fully responsible for compliance with all of the coordination and other technical requirements that apply to the underlying licensees. Even if the AWS-3 licensees have successfully coordinated, the lessee should be required to coordinate separately; the underlying coordination cannot transfer to the lessee unless it will use the very same network configuration that was coordinated. Raytheon submits that, to ensure such coordination takes place, licensees in and near Protection Zones should have an obligation in the rules to notify federal agencies directly of the lease arrangements, *i.e.*, using the contacts suggested in the previous paragraph above.

Further, if there is a transfer of control or assignment of an AWS-3 license in or near a Protection Zone, there should be a requirement that AWS licensees provide advance notice to the federal contacts for any Protection Zone that overlaps the licensee's operating

³³ See Comments of Verizon Wireless at 23.

territory simultaneously with their applications to the FCC. The Federal users involved with the protected sites should not have to routinely scour the FCC's public notices. There may be reasons that federal users would comment on or oppose a license assignment or transfer, especially if there has been a history of interference problems. At the very least, such notice will keep federal users apprised of the entities from which they may receive coordination requests or with whom they would be dealing should there be interference.

Finally, the Commission should not adopt T-Mobile's suggestion that devices should be allowed to operate that are not under the control of a fixed base station if that can be accomplished in a manner consistent with protection against interference requirements to federal operations.³⁴ Any such flexibility should *not* be codified. Having said that, Raytheon submits that this type of flexibility might be considered in a specific coordination scenario by a federal agency. But protected federal operators should be under no obligation to consent to such flexible use. Thus, the rules should make clear that devices in or in the vicinity of a Protection Zone must be under the control of an AWS base station unless the federal user (or users) within a given Protection Zone explicitly consents to such operation. The requirement of operation only when within the control of a fixed base station is particularly appropriate because Protection Zone size in the 1695-1710 MHz band should be, as proposed, predicated on base station location.³⁵

II. CONCLUSION

For the foregoing reasons and those in Raytheon's opening comments, the Commission should adopt sharing, technical, operational, and licensing rules applicable to AWS

³⁴ Comments of T-Mobile at 29.

³⁵ Thus, the control of the base station should be direct, rather than relayed through mobiles or other non-fixed stations.

licensees for the 1695-1710 MHz band that adequately protect MetSat operations in the band as well as MetSat and MetAids in the adjacent 1675-1695 MHz band. In addition, the Commission should reject consideration of pairing an allocation for AWS-3 operations in the 1695-1710 MHz band with 2095-2110 MHz or any portion of the 2360-2395 MHz flight testing spectrum.

Respectfully submitted,

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